CLAIMS

1. An injection module assembly comprising:

a fuel rail defining a passageway through which a fuel can flow; and

a fuel injector for delivering the fuel in the passageway to a combustion chamber of an internal combustion engine, the fuel injector defining a longitudinal axis and having an outlet end and an inlet end in opposing relation along the longitudinal axis, the injector being coupled to the fuel rail at the inlet end such that an interface between the fuel rail and the inlet end is substantially sealed to substantially prevent leakage of both liquid fuel and hydrocarbon emissions from the interface.

2. The injection module assembly of claim 1, wherein the fuel injector is coupled to the fuel rail by laser welding.

3. The injection module assembly of claim 1, wherein the fuel injector is coupled to the fuel rail by brazing.

4. The injection module assembly of claim 1, wherein the fuel injector is coupled to the fuel rail by TIG welding.

5. The injection module assembly of claim 1, wherein the fuel injector is coupled to the fuel rail without using a seal ring adjacent the interface.

6. The injection module assembly of claim 1, wherein the fuel injector is directly connected to the fuel rail.

7. The injection module assembly of claim 1, wherein the fuel injector is coupled to the fuel rail via an extension tube.

8. The injection module assembly of claim 1, wherein the fuel injector is coupled to the fuel rail via a bellows.

9. The injection module assembly of claim 1, further comprising an overmolding covering at least a portion of the fuel rail and at least a portion of the fuel injector.

10. The injection module assembly of claim 1, further comprising a damper inside the passageway of the fuel rail for damping pressure pulsations created by the injector.

11. The injection module assembly of claim 1, further comprising an electrical connector coupled to both the fuel rail and the injector for providing electrical power to the injector.

12. The injection module assembly of claim 11, wherein at least a portion of the electrical connector is overmolded.

13. An injection module assembly comprising:

a fuel rail defining a passageway through which a fuel can flow;

a plurality of fuel injectors for delivering the fuel in the passageway to a respective plurality of combustion chambers in an internal combustion engine, the fuel injectors being coupled to the fuel rail such that an interface between the fuel rail and each fuel injector is substantially sealed to substantially prevent leakage of both liquid fuel and hydrocarbon emissions from the interface;

an electrical connector coupled to the fuel rail and to each of the injectors for providing electrical power to each injector; and

an overmolding covering at least a portion of the fuel rail, at least a portion of the electrical connector, and at least a portion of each fuel injector.

14. The injection module assembly of claim 13, wherein the fuel injectors are coupled to the fuel rail by laser welding.

15. The injection module assembly of claim 13, wherein the fuel injectors are coupled to the fuel rail by TIG welding.

16. The injection module assembly of claim 13, wherein the fuel injectors are coupled to the fuel rail by brazing.

17. The injection module assembly of claim 13, wherein the fuel injectors are coupled to the fuel rail without using a seal ring adjacent the interface.

18. The injection module assembly of claim 13, further comprising a damper inside the fuel rail for damping pressure pulsations created by the injectors.

19. The injection module assembly of claim 13, wherein the fuel injectors are directly connected to the fuel rail.

20. The injection module assembly of claim 13, wherein the fuel injectors are coupled to the fuel rail via an extension tube.

~~21.~~ 20 The injection module assembly of claim ~~13~~ 12, wherein the fuel injectors are coupled to the fuel rail via a bellows.

22. A method of manufacturing an injection module assembly having a fuel rail, a plurality of fuel injectors, and an electrical connector, the method comprising:

coupling the fuel injectors to the fuel rail such that respective interfaces between the fuel rail and the fuel injectors are substantially sealed to substantially prevent leakage of both liquid fuel and hydrocarbon emissions from the interfaces;

coupling the electrical connector to the fuel rail and to each of the injectors to provide electrical power to the injectors; and

overmolding at least a portion of the fuel rail, at least a portion of the electrical connector, and at least a portion of each injector to form an injection module assembly.

23. The method of claim 22, wherein the injectors each define a longitudinal axis and have an outlet end and an inlet end in opposing relation along the respective longitudinal axis, and wherein each injector is coupled to the fuel rail at the inlet end.

24. The method of claim 22, wherein the injectors are coupled to the fuel rail by one of laser welding, TIG welding, and brazing.

25. The method of claim 22, wherein the fuel injectors are coupled to the fuel rail without using a seal ring adjacent the interface.

26. The method of claim 22, further comprising inserting a damper into the fuel rail for damping pressure pulsations created by the injectors.

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